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PROVISIONAL PATENT APPLICATION

CAMEL-BACK DIGITAL ORGANIZER

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CAMEL-BACK DIGITAL ORGANIZER

RELATED APPLICATIONS

The present application is related to and claims the benefit of priority from commonly-owned U.S. patent application serial no. 08/905,463, filed August 4, 1997, and entitled, USER INTERFACE METHODOLOGY FOR MICROPROCESSOR DEVICE HAVING LIMITED USER INPUT, the disclosure of which is hereby incorporated by reference.

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BACKGROUND OF THE INVENTION

The present invention relates generally to electronic organizers and, more particularly, to apparatus and methods providing integration of electronic organizers with cellular phone devices.

With each passing day, there is ever increasing interest in providing integrated solutions for connected information appliances. Here, the general environment includes "appliances" in the form of electronic devices such as cellular phones, pagers, and battery-powered, hand-held devices (e.g., REX™, Palm Pilot™ and Windows™ CE devices). Such a device, in typical use, is occasionally connected to a desktop personal computer or PC, which stores information for the user. Still further, the PC may be connected to a server computer, which stores information important to the user's business. What the user really wants is an integrated solution such that information of each device remains available for use in other devices in a convenient, transparent manner.

This is particularly the case for cellular phones, given their tremendous popularity. Although cellular phones are commonplace, a cellular phone user today finds that his or her device is not well integrated with other electronic devices. Consider, for instance, a user who maintains address-book or "contacts" information on a hand-held device. Despite having maintained extensive information about his or her contacts electronically, the user is forced to manually re-enter information into the cellular phone when placing a phone call. What the user wants instead is the ability to make calls and look up addresses and phone numbers, even check schedules and send electronic mail, from a single integrated solution. Yet to date, designers have struggled over how to integrate disparate information -- such as calendaring, scheduling, and contact information -- among disparate devices.

What is needed is a solution which combines telephony with personal information management in a single integrated hand-held unit. Given the millions of cellular phones in service today, such a solution would comprise a user-serviceable attachment allowing a legacy phone to be upgraded to a "smart" phone without requiring a change to the underlying phone equipment (i.e., in a manner which maintains compatibility with legacy hardware) and without requiring a complicated installation procedure. The present invention fulfills this and other needs.

SUMMARY OF THE INVENTION

The present invention provides a "Camel-Back" Digital Organizer (CDO) unit or system, that is designed to attach to a cellular phone in the same manner as an auxiliary battery, and to interface with the phone through contact points available in the phone's interface port (e.g., StarTac™ cellular port). The CDO unit is preferably implemented as an add-on component which can be easily attached and detached from a phone by a customer and, once in place, can dramatically enhance the phone functionality, converting the phone into a "smart" phone.

The CDO unit comprises a digital organizer having a main housing supporting, on its back or upper surface, a set of input/navigation buttons and a display screen. The set of buttons comprise a circular pad or circular configuration of buttons, placed at the bevel end of the unit, which are designed as a directional navigation disc or "NaviDisc." The NaviDisc provides for LEFT, RIGHT, UP, DOWN, and SELECT buttons (i.e., five buttons total). The unit's housing includes a gentle slope for facilitating user access to these buttons. The unit also includes a second set of buttons along its top edge, which are designed to mimic the rubber buttons on the phone itself.

In typical use, the CDO device is used in tandem with a desktop computer or PC. The desktop PC is used by the user when "at the office," and the CDO device is employed when the user is "on the road" (i.e., out of the office). Thus during typical use, large repositories of data reside on the desktop PC which are periodically transferred or synchronized with data residing on the portable CDO device. Multiple techniques exist for getting data from the desktop PC to the portable computing device, through device port(s). Using a device input/output (I/O) protocol or standard, data can be streamed from the desktop PC to the portable computing device via a direct cable (or infrared) connection, such as using a serial port-to-serial port connection. To facilitate communication of the CDO unit with devices other than the host phone, therefore, the unit includes at its base a small input/output stereo jack to be used, in conjunction with a plug-in cable, as a serial synchronization connection to an external device, such as a PC. The jack is exposed even when the unit is

clipped onto the phone, allowing a user to connect the CDO unit to a PC without having to unclip it.

The CDO unit embodies system and application software. The system software includes a single purpose operating system (SPOS) which functions to provide a consistent mechanism by which applications can communicate with the device. In this manner, applications are shielded from hardware complexity, such as hardware interrupts and ports. Software application programs or modules are provided for user operation of the device. The application programs can be implemented as individual modules, which are controlled by a "module selector." The module selector serves as a user interface or shell representing the top-level or "home" display presented to a user. In the currently-preferred embodiment, the module selector presents the user with selection icons for navigating to different applications or modules of functionality. In an exemplary embodiment, the applications include a contact module for addresses and phone numbers, a schedule module for calendar events, a "to do" list for various tasks, a memos module for arbitrary text documents, a world time module for clock settings and world travel time translations and a preferences module for various device settings and configurations. The applications interface with the phone through the phone's interface connector. For instance, a customer can look up a phone number for a person in the contact module and press a button to initiate a call to that number.

Communication methodologies of the present invention are described for facilitating use of the organizer component with a host cellular phone. Exemplary methods include: a method supporting user-initiated voice call from the organizer; a method supporting synchronization of a host phone list (e.g., contact information list) with a corresponding digital organizer list; and a method providing a synchronization protocol between the digital organizer and any host (e.g., PC or server).

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A is a diagram, in perspective view, illustrating a "camel-back" digital organizer (CDO unit) of the present invention.

Fig. 1B is a diagram illustrating the housing of the CDO unit, which includes a gentle slope for facilitating user access to input buttons.

Fig. 1C is a diagram illustrating a "NaviDisc" which provides LEFT, RIGHT, UP, DOWN, and SELECT buttons.

Fig. 1D is a diagram, in perspective view, illustrating the underside surface of the CDO unit.

Fig. 1E is a diagram illustrating a lateral view of the unit.

Fig. 1F is a diagram illustrating a desktop charging station which can charge the batteries on a phone as well as an auxiliary battery or the CDO unit.

Fig. 2 is a block diagram illustrating the general hardware architecture of the CDO unit.

Fig. 3 is a block diagram illustrating implementation of application programs, which are controlled by a module selector.

Fig. 4 is a bit map screen shot illustrating a display user interface, which comprises a plurality of application or module icons from which the user can invoke particular application functionality.

Fig. 5A is a flow chart illustrating a method of the present invention supporting user-initiated voice call from the organizer.

Fig. 5B is a flow chart illustrating a method of the present invention supporting synchronization of a host phone list (e.g., contact information list) with a corresponding digital organizer list.

Fig. 5C is a flow chart illustrating a method of the present invention providing a synchronization protocol between the digital organizer and any host (e.g., PC or server).

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Camel-Back Digital Organizer

A. Introduction

In accordance with the present invention, an ideal digital organizer should have a low-profile form factor, so that it is easily accommodated by a target cellular phone device. It should be a self-contained unit, so that it can operate independently of the target cellular phone device. It should, for instance, maintain a separate power supply so that its operation is not tied to the battery life of the target cellular phone device. The ideal digital organizer should also maintain some level of connectivity with the host (i.e., a cellular phone), typically through a conventional port provided by the cellular phone. Common to most cellular phones is an optional auxiliary battery attachment. Also common is an interface port (e.g., StarTac™ cellular port), usually used to attach the phone to a laptop computer for portable communication purposes. These aspects of existing cellular phone hardware are exploited to provide a digital organizer system with the foregoing features.

For purposes of illustration, the following discussion focuses on a digital organizer which has as its target or host phone the popular Motorola StarTac™ model cellular phone. For aesthetic purposes, the design closely matches the physical appearance of the phone's auxiliary battery. The design, construction, and operation taught by the present invention are not limited, however, to StarTac model phones but can be applied advantageously to other phones, including ones of markedly different design and style.

B. Mechanical design

The present invention provides a "Camel-Back" Digital Organizer (CDO) system 100, illustrated in Figs. 1A-B, that is designed to attach to a cellular phone in the same manner as an auxiliary battery, and to interface with the phone through the contact points in the interface port. The CDO system is preferably implemented as an add-on component which can be easily attached and detached from a phone by a user and, once in place, can dramatically enhance the phone's functionality, converting the phone into a "smart" phone.

As shown in perspective view in Fig. 1A, the CDO unit or system 100 comprises a digital organizer having a main housing 105 supporting, on its back or upper surface 110, a set of input/navigation buttons 120 and a display screen 130. The set of buttons 120 comprise a circular pad or circular configuration of buttons, placed at the bevel end of the unit, which are designed as a directional navigation disc or "NaviDisc." As shown in the elevational view in Fig. 1B, the unit 100 includes a second of set of buttons 150 along a top edge of the unit which are designed to mimic the rubber buttons on the phone itself. As shown in further detail in Fig. 1C, the NaviDisc 120 provides for LEFT 123, RIGHT 122, UP 121, DOWN 124 and SELECT 125 buttons (i.e., five buttons total). As shown in Fig. 1B, the housing includes a gentle slope 115 for facilitating user access to these buttons.

In typical use, the CDO device is used in tandem with a desktop computer or PC. The desktop PC is used by the user when "at the office," and the CDO device is employed when the user is "on the road" (i.e., out of the office). Thus during typical use, large repositories of data reside on the desktop PC which are periodically transferred or synchronized with data residing on the portable CDO device. Multiple techniques exist for getting data from the desktop PC to the portable computing device, through device port(s). Using a device input/output (I/O) protocol or standard, data can be streamed from the desktop PC to the portable computing device via a direct cable (or infrared) connection, such as using a serial port-to-serial port connection. To facilitate communication of the CDO unit 100 with devices other than the host phone, therefore, the unit 100 includes at its base a small input/output stereo jack 140 to be used, in conjunction with a plug-in cable, as a serial synchronization connection to an external device, such as a PC. The jack is exposed even when the unit is clipped onto the phone, allowing a user to connect the CDO unit to a PC without having to unclip it.

In a preferred embodiment, the display screen 130 on the unit is a Citizen™ high contrast LCD (liquid crystal display) display (Citizen Part No. 5104, available from Citizen of Japan); the display includes a pixel grid designed to support a graphical user interface. The display is used to render a combination of text and graphics as part of a graphical user interface. In the preferred embodiment, the display is a monochrome LCD

display, for instance with approximately 160x100 pixel resolution, and includes a clear plastic window over the LCD glass for shock resistance. In use, the unit is held such that the surface 110 generally faces toward the user when the unit is being used as an organizer (with or without attachment to a host phone), so that the user has ready access to the unit's two button sets and can easily view information on the display 130. As also illustrated in the perspective view, the housing 105 includes lateral recesses 113 which facilitate placement of the unit within the auxiliary battery compartment of a host cellular phone. When the host phone is in use (to place a voice call), the unit is held such that the surface 110 fits in the palm of the user's hand, that is, generally held in a manner such that the display 130 is facing away from the user's view.

Fig. 1D provides a perspective view of the underside surface 107 of the unit 100. An additional lateral view is provided by Fig. 1E. The CDO unit 100 clips onto the phone in the same manner as the phone's auxiliary battery. At the bevel end of the unit 100 is a metal spring connector 170 which grips the top of the phone and which extends to allow the user to line up and attach the bottom portion of the unit. At the bottom end of the housing 105 are two plastic connectors 108, 109 which fit into slots on the phone and hold the unit in place.

Also at the bottom is a communication interface plug or connector 160 which snaps into a corresponding communication interface port of the phone (e.g., StarTac™ cellular port). The communication connector is designed to access the phone interface connector directly. The power requirements and pin-outs are designed to meet the interface connector specification of the target phone being supported (e.g., Motorola specification for a Motorola StarTac™). Through this connector, the CDO can issue telephony requests to initiate a dial, for instance. If desired, the connector 160 can include a flexible plastic hinge to allow for better alignment of the pins as the unit is clipped on by the user.

The actual procedure for clipping the CDO unit 100 onto a host phone is simple. The user first slips the metal spring connector into a corresponding slot on the phone then pulls down to extend the bottom pins over the base of the phone. Then, the user lines up the bottom pins with the slots at the base of the phone and releases the spring, thus allowing

the base pins to slide into place. As a final step, the user presses on the back of the connector hinge to ensure that the connector is firmly in place. This is essentially the same simple procedure as attaching the auxiliary battery.

With existing battery technology, talk time for the cellular phone is relatively limited, on the order of hours. In the preferred embodiment, the power supply for the unit or device 100 is preferably separated from that of the phone so that the device can operate independently of the phone's power status; thus, the limited battery life for the cellular phone does not become a limiting factor for the organizer. In this manner, the user can continue to use the organizer even if he or she has run out of talk time for the cellular phone. Still further, the user can detach the organizer component from the combined unit and continue to use it, without having to also carry the comparatively-larger cell phone component with its dead battery. Not only does the user continue to have access to contact database information, but the user also continues to have access to the scheduling and alarm functionality provided by the organizer.

The recommended power supply is a set of stacked watch batteries (e.g., CR2025) which are inserted into a battery compartment 180 on the back side 107 of the unit 100, as illustrated in Fig. 1D. A simple clip or screw cover is used to seal the compartment. The power consumption of the unit will, in typical use, be minimal such that a battery life of six months or better is realistic.

A host phone typically includes as a standard accessory a desktop charging station which can charge the batteries on the phone as well as an auxiliary battery. As shown in Fig. 1F, a StarTac cellular phone 190 includes (as an accessory) a charging station or base 180. The charging base 180 includes an auxiliary battery cradle or slot 181, for accommodating an auxiliary battery. The slot 181 readily accommodates the CDO unit 100. With a minor modification, this same charging station may be adapted to both charge the phone batteries as well as synchronize information on the CDO unit using a serial cable connected to a desktop PC. As shown, for instance, the charging base 180 is modified to include a serial communication link 185, thereby establishing serial communication between the unit 100 (via its serial connector jack) and a desktop computer 195 via a RS-232 serial

port; the RS-232 or Recommended Standard-232 is a standard interface approved by the Electronic Industries Association (EIA) for connecting serial devices.

C. Device hardware

Fig. 2 is a block diagram illustrating the general hardware architecture of a camel-back portable computing device or digital organizer in which the present invention may be embodied. As shown, the CDO unit 100 includes motherboard circuitry 200 comprising a low power 8-bit central processing unit (CPU) 205, a memory 210, a display 201, an input 202, ports 203, a UART 204, and an ASIC (Application Specific Integrated Circuit) 206, all connected via a system bus 241 (or similar architecture). The CPU 205 may comprise a Toshiba® Z80-compatible microprocessor, such as Toshiba Part No. T6B31, available from Toshiba America, Inc. of New York, New York. The Display 201 includes a screen device and supporting circuitry for displaying information, such as a liquid crystal display (LCD) display screen 130 previously shown in Fig. 1A. The Input 202 comprises a key set, either physical or logical (e.g., on screen buttons), and supporting circuitry. As previously described, a terse set comprising two separate groups or subsets is employed. Memory 210 comprises persistent memory 211, volatile memory 220, non-volatile RAM memory 230, and video memory (VRAM) 240. Persistent memory 211 is typically implemented as a ROM or read-only memory. As shown, it stores a single-purpose operating system (SPOS) 212 and application(s) 213. Volatile memory 220 is a "scratch" memory, for storing temporary computation results. It typically is implemented as Static RAM (random-access memory) or SRAM, for providing a work space for the operating system and applications. Non-volatile RAM memory 230 represents battery-backed SRAM memory or Flash memory, for storing context information from one session to another. When the device 200 is powered down, the memory 230 stores user data from that session. The UART (Universal Asynchronous Receiver-Transmitter) 204 handles asynchronous serial communication through the stereo connector, which receives a plug-in cord providing a null-modem serial connection to another device. The ASIC (Application Specific Integrated Circuit) logic 206 serves to link the components together and drive the interface connector to

the phone as well as power management circuitry for the device. With this design, the unit consumes very little power and yields extremely long battery life.

D. Device software

1. General

The single purpose operating system (SPOS) functions to provide a consistent mechanism by which applications 213 can communicate with the device. In this manner, applications 213 are shielded from hardware complexity, such as hardware interrupts and ports. In other words, it serves to abstract hardware complexity to a high-level application programming interface (API).

Applications 213 are software application programs or modules provided for user operation of the device. As shown in Fig. 3, for instance, the application programs can be implemented as modules 301- 306, which are controlled by a module selector 300. The module selector 300 serves as a user interface or shell representing the top-level or "home" display presented to a user. In the currently-preferred embodiment, the module selector 300 presents the user with selection icons for navigating to different applications or modules of functionality. In an exemplary embodiment, the applications include a contact module for addresses and phone numbers, a schedule module for calendar events, a "to do" list for various tasks, a memos module for arbitrary text documents, a world time module for clock settings and world travel time translations and a preferences module for various device settings and configurations. The applications interface with the phone through the phone's interface connector. For instance, a user can look up a phone number for a person in the contact module and press a button to initiate a call to that number.

In an exemplary embodiment, the device 100 is constructed from a modified REX™ portable device, such as Model REX-3 available from Franklin Electronic Publishers of Burlington, NJ, with the device being modified to accommodate the design of housing 105. Further description of the design and operation of the REX device is provided in commonly-owned U.S. patent application serial no. 08/905,463, filed August 4, 1997, and

entitled, USER INTERFACE METHODOLOGY FOR MICROPROCESSOR DEVICE HAVING LIMITED USER INPUT, the disclosure of which has been incorporated by reference.

2. User interface

a. Introduction

In the most-preferred embodiment, the user interface of the present invention implements a "single-click" style of button operation. Given a device with a small number of input buttons, for instance, various key combinations beyond the simple clicking of each individual button could be created. Buttons could, for example, be "double clicked" by users or combined to create double or triple (or even more) key combinations. Although such an approach yields more logical buttons from the available physical buttons, the approach requires users to memorize key combinations which are not intuitive (and are a source of endless grief for users of such devices). Accordingly, in the most-preferred embodiment, a single-click style is adopted, so that users can associate each button with a particular task for a given program context.

In addition to the single-click style, the preferred embodiment imposes "click consistency" for each button. Generally, the same buttons are used over and over again to perform their respective tasks, even though the user has navigated to different modules of an application. In this manner, the user is presented with a consistent interface or metaphor which can be easily mastered. If, on the other hand, behavior of the button changed from one portion or context of the application to another, the user must relearn the functionality of each button.

Also in the preferred embodiment, the user interface supports in a small form factor device the browser-style navigation that users have become accustomed to on desktop computers (e.g., using Web browsers). More particularly, the interface supports up, down, forward, and backward navigation for allowing a user to "drill down" or "drill across" his or her data. This allows the user to find a data item (link) of interest and then drill down into it. Once at the appropriate level, the user can then easily select the particular item of interest. Further, once the user has selected or entered an item, the system provides the ability for the

user to return to "home" with a single button click. As set forth below, the present invention provides an interface allowing browser-style navigation in a device having a terse set of input keys.

b. Navigation model

The module selector presents an array of icons, each one corresponding to a particular application within the system. At all times, the system displays a highlight on screen for indicating "focus" -- that a particular item is the focus of further user input (at that point in time). At the top level or "home," focus is indicated by a highlight around one of the application icons.

As shown in Fig. 4, for instance, display user interface 420 comprises a plurality of application or module icons (e.g., icons 421, 423), from which the user can invoke particular application functionality. As shown, icon 421 currently has "focus," as indicated by focus outline (rectangle) 425. Recall that the CDO device 100 includes a NaviDisk 120. These buttons function as follows. The forward or right button (e.g., button 122) and backward or left button (e.g., button 123) allow the user to navigate forward or backward (respectively), within a given level of the interface. For the top-level view shown by display 420, for instance, the forward and backward buttons move the selective or highlight from one icon to another, either in a forward or reverse direction depending on which of the two buttons or keys is activated. The up button (e.g., button 121) and down button (e.g., button 124) allow the user to navigate upward or downward (respectively), among levels of the interface. In the currently-preferred embodiment, a highlight or selector is presented at all levels of the interface, so that the functionality of the buttons remains consistent and intuitive. As a result, the user always knows how to shift focus from one item to another regardless of what level of the interface the user has navigated to.

Working in conjunction with the left, right, up, and down buttons that shift focus through a current level, a select button (e.g., button 125) invokes (or "selects") the item currently having focus, when the button is activated by the user. At the top-level view shown at 420, for instance, user activation of the select button serves to select the calendar module

represented by icon 421. In response to this selection, the system "drills down" into the calendar module.

Using the select key in combination with the left, right, up, and down buttons, the user is easily able to navigate up and down interface levels as well as across a particular level. In other words, the buttons provide a navigation model where the user can move from point to point for changing direction within a level; selection itself always indicates the current focus or point of activity (which will occur) within a given level. Selecting that item with the select button causes the system to drill down into the functionality represented by the selected item.

The remaining buttons of the second set (i.e., set 150) can be programmed to augment this basic design. For instance, a home button can provide a browser-like key allowing a user to always return to "home" -- that is, a general or overview display screen. Regardless of how many levels the user has drilled down into using this technique, the home button will always return the interface back to the top-level view (e.g., such as the "home" view represented by display 420). For the embodiment illustrated by Fig. 4, "home" is the module selector display or shell shown by display screen 420. In this manner, no matter how far a user has "drilled down" in the interface, the home key will always return the user to the top-level view or shell, with a single button click.

Another one of the buttons can be programmed to serve as a view switch button. A view switch button allows the user to instruct the system to switch to a different view within a given level, thus providing the user with a different way of viewing the data. Consider, for instance, presentation of calendar data by a calendar module. Calendar or time-related data can be represented or displayed in multiple ways. One way to represent such information, for example, is to display a linear (event-by-event) list. Alternatively, such information could be presented on a week-by-week basis -- that is, viewing data over a span of a given week. Yet another way to view such information is a monthly view which highlights dates for a given month which have events (or other user data). The view switch, therefore, cycles through different views at a particular level, with the actual views available being dictated by the particular application (module). In order to simplify the interface for

the user, the number of views available at a given level should typically not exceed about four views.

Further description of the construction and operation of a user interface suitable for a device having a terse set of input keys or buttons, such as the device 100, can be found in the abovementioned commonly-owned U.S. patent application serial no. 08/905,463, which has been incorporated by reference above.

E. Communication methodologies

In accordance with the present invention, communication methodologies are provided for facilitating use of the organizer component with a host cellular phone. Exemplary methods include the following.

1. User-initiated voice call from the organizer

As previously described, the digital organizer (i.e., unit 100) is linked to a host cellular phone through a communication interface plug or connector (e.g., connector 160) which snaps into a corresponding communication interface port of the phone. As shown in Fig. 5A, a method 500 of the present invention supporting user-initiated voice call from the organizer includes the following steps. At step 501, the user selects a contact from a phone list stored in the organizer, which includes phone number information for each contact. If multiple phone numbers are available for a particular contact, the user selects one number to dial. The user can easily access contact information, using the previously-described navigation methodology of the preferred user interface. After the user selects a contact entry, the user selects an option requesting that the digital organizer make a voice call, as indicated by step 502. As indicated by step 503, the digital organizer includes a communication protocol or command set for communicating with the host phone. In this regard, a conventional command set may be employed, such as the standard modem "AT" command set, which is documented in the patent, trade, and technical literature; see e.g., U.S. Robotics' detailed references on the AT command set, currently available at *http://ae.pcd.usr.com/techref/atref.htm*, the disclosure of which is hereby incorporated by

reference. As shown at step 504, the digital organizer attempts to get the attention of the host phone, by sending a hand shake signal. If acknowledgment from the host phone is not received before a time-out interval or set number of cycles, the communication session aborts. Such will be the case if the host phone is already on a voice call or is otherwise too busy servicing other requests. If, on the other hand, the host phone is available, it will send an acknowledgment message "ready" as shown in step 505. Upon receipt of an acknowledgment, the digital organizer packages the request and transmits it to the host phone, at step 506. For example, the digital organizer can transmit an AT command which includes the phone number to dial. Finally, the host phone returns a result code indicating "success" or "failure"; this is indicated at step 507. If desired, this result can be logged at the digital organizer. Thereafter, the voice call can proceed without further assistance from the digital organizer.

2. Synchronization of host phone list with digital organizer list

As shown in Fig. 5B, a method 520 of the present invention supporting synchronization of a host phone list (e.g., contact information list) with a corresponding digital organizer list includes the following steps. As indicated by step 521, the digital organizer includes, as before, a communication protocol or command set (e.g., standard modem "AT" command set) for communicating with the host phone. The command set includes a command of allowing the digital organizer to query the host phone for discerning the currently-stored contents in the list of a particular phone. At some convenient time, such as during "boot up" of the digital organizer, the digital organizer queries the phone for determining its ID (to distinguish it from other phones which the organizer might be attached to) and queries the phone for enumerating the contents of its slots (i.e., list of data items), as shown at step 522. At this point, the digital organizer can (optionally) determine whether the list of the host phone is different from that of the organizer.

At step 523, a request is received (e.g., the user selects an option) to synchronize a list stored in the organizer with a corresponding one stored in the host phone. Alternatively the digital organizer is configured to initiate this request automatically, such as

a user-specified interval or in response to some other user activity, or automatic detection of a difference between the lists (e.g., at "boot up" or upon receiving a user edit). In any event, at the conclusion of the step, the digital organizer has scheduled the task that it needs to synchronize its list with that of the host phone. In the currently-preferred embodiment, this is scheduled in a transaction queue as a task request specifying the updating (e.g., insert, delete, or modify) of a particular record, or set of records; the request includes the new value or values which require update.

The method proceeds to process the request as follows. As shown at step 524, the digital organizer attempts to get the attention of the host phone, by sending a hand shake signal. If acknowledgment from the host phone is not received before a time-out interval or set number of cycles, the communication session aborts (in a manner similar to that previously described for step 504). If the host phone is available, it will send an acknowledgment message "ready" as shown in step 525.

Upon receipt of an acknowledgment, the digital organizer packages the synchronization request and transmits it to the host phone, at step 526. Although the host phone may include a unique identifier for each slot, it typically will not include any other support for synchronization, such as time stamps or the like. To accommodate this limitation of the host phone, the digital organizer stores a time stamp for each one of its own entries and a time stamp (per host phone) indicating when the last synchronization occurred. In the face of a disparity for entries at the organizer verses the phone, if the time stamps of the entries at the organizer are later than that of last synchronization, the values at the digital organizer takes precedence. Otherwise, the system assumes that the host phone is the authority (for last-entered changes), with the values at the host phone taking precedence. A user-configurable option can be provided for forcing a particular precedence, if desired. In the event that the organizer determines that its list takes precedence, the digital organizer transmits an AT command which includes the identifier (ID) for the slot (or slots) to update, together with relevant values. In the event that the list of the phone takes precedence, step 526 would operate such that the digital organizer would instead apply updates to its own list, based on values retrieved from the phone, from the abovementioned query. In the instance

that the host phone performs synchronization (i.e., processes a "sync" request), it returns a result code indicating "success" or "failure"; this is indicated at step 527.

3. Protocol for wireless and wired synchronization

As shown in Fig. 5C, a method 540 of the present invention providing a synchronization protocol between the digital organizer and any host (e.g., PC or server) includes the following steps. At step 541, the digital organizer and the host exchange a hand shake according to a known communication protocol (e.g., AT command set), thereby establishing a connection (session). At step 542, the digital organizer is asked to summarize any changes, based on the time (i.e., time stamp) of the last synchronization and time stamp of individual changes to its data. Here, changes include insertions, deletions, and modifications. The changes can be summarized quite simply, by submitting the identifiers or IDs for the items, together with corresponding time stamps (of the changes). At a later point in time, the digital organizer is asked for the new contents of any insertions or modifications; contents for any deletions is not required. This is indicated at step 543, where the digital organizer transmits data (i.e., new contents) to the host. In addition to this request asking for data, the digital organizer can be instructed at this point to make particular modifications to its data.

As illustrated by steps 544 and 545, the process operates bi-directionally, with the host transmitting its changes back to the digital organizer. For example, at step 544, the host summarizes any changes to its data and transmits that to the digital organizer. In addition to this request asking for data, the host can be instructed at this point to make particular modifications to its data. Then, in a manner corresponding to that done at step 543, the host transmits any new contents to the digital organizer, as shown at step 545. Ultimately, the digital organizer and the host terminate the communication session, as illustrated at step 546.

The foregoing protocol is suitable for use in both wireless and wired synchronization scenarios. In a wired synchronization scenario, the protocol is exercised over the serial connection from the digital organizer's serial jack to a host's serial jack (e.g.,

PC's RS-232 input jack). The same synchronization mechanism which allows for connectivity to a PC through the stereo jack can be applied to a serial connection made with a data call using the cellular phone itself. In this wireless synchronization scenario, the digital organizer first initiates a data phone call through the host cellular phone, using its command set. In this manner, the digital organizer effectively employs the host cellular phone as a serial modem for establishing a communication session or connection with a host computer. Once the session is established, the digital organizer can exercise the protocol over the connection. This wireless synchronization allows users to update their data via a synchronization service which is available anywhere the cell phone itself operates.

Additional methodologies supporting synchronization and/or reconciliation of individual data items are described in commonly-owned U.S. patent application serial no. 08/923,612, filed September 4, 1997, and entitled, SYSTEM AND METHODS FOR SYNCHRONIZING INFORMATION AMONG DISPARATE DATASETS, the disclosure of which is hereby incorporated by reference. Still further description can be found in commonly-owned U.S. patent application serial no. 09/020,047, filed February 6, 1998, and entitled, METHODS FOR MAPPING DATA FIELDS FROM ONE DATA SET TO ANOTHER IN A DATA PROCESSING ENVIRONMENT, the disclosure of which is hereby incorporated by reference.

F. Integrated messaging through addition of pager functionality

Because of the limited battery life of cellular phones, many cellular phone users leave their phones off and, instead, carry around a pager to receive pages. Only upon receiving a page will the user at that time initiate a voice call to call the paging party back. Although this approach provides a workable solution, it is not an attractive one. In particular, the approach requires the user to also carry around an extra device, the pager, which can be bulky. These users would benefit from having the one-way paging mechanism integrated into the CDO device itself. In accordance with the present invention, the organizer component is adapted in an alternative embodiment to include paging circuitry suitable for receiving pages. Since the organizer component maintains a separate power supply, the user can receive pages without relying on the limited battery life of the cellular phone.

While the invention is described in some detail with specific reference to a single-preferred embodiment and certain alternatives, there is no intent to limit the invention to that particular embodiment or those specific alternatives.

CAMEL-BACK DIGITAL ORGANIZER

ABSTRACT OF THE DISCLOSURE

A "Camel-Back" Digital Organizer (CDO) system is described that is designed to attach to a cellular phone in the same manner as an auxiliary battery, and to interface with the phone through contact points available in the phone's interface port. The CDO system is preferably implemented as an add-on component which can be easily attached and detached from a phone by a user and, once in place, can dramatically enhance the phone's functionality, converting the phone into a "smart" phone. The CDO unit includes a main housing supporting, on its back or upper surface, a set of input/navigation buttons and a display screen. The set of buttons comprise a circular pad or circular configuration of buttons, placed at the bevel end of the unit, which are designed as a directional navigation disc or "NaviDisc." The NaviDisc provides for LEFT, RIGHT, UP, DOWN, and SELECT buttons (i.e., five buttons total). The unit also includes a second of set of buttons along its top edge, which are designed to mimic the rubber buttons on the phone itself. Communication methodologies of the present invention are described for facilitating use of the organizer component with a host cellular phone. Exemplary methods include: a method supporting user-initiated voice call from the organizer; a method supporting synchronization of a host phone list (e.g., contact information list) with a corresponding digital organizer list; and a method providing a synchronization protocol between the digital organizer and any host (e.g., PC or server).

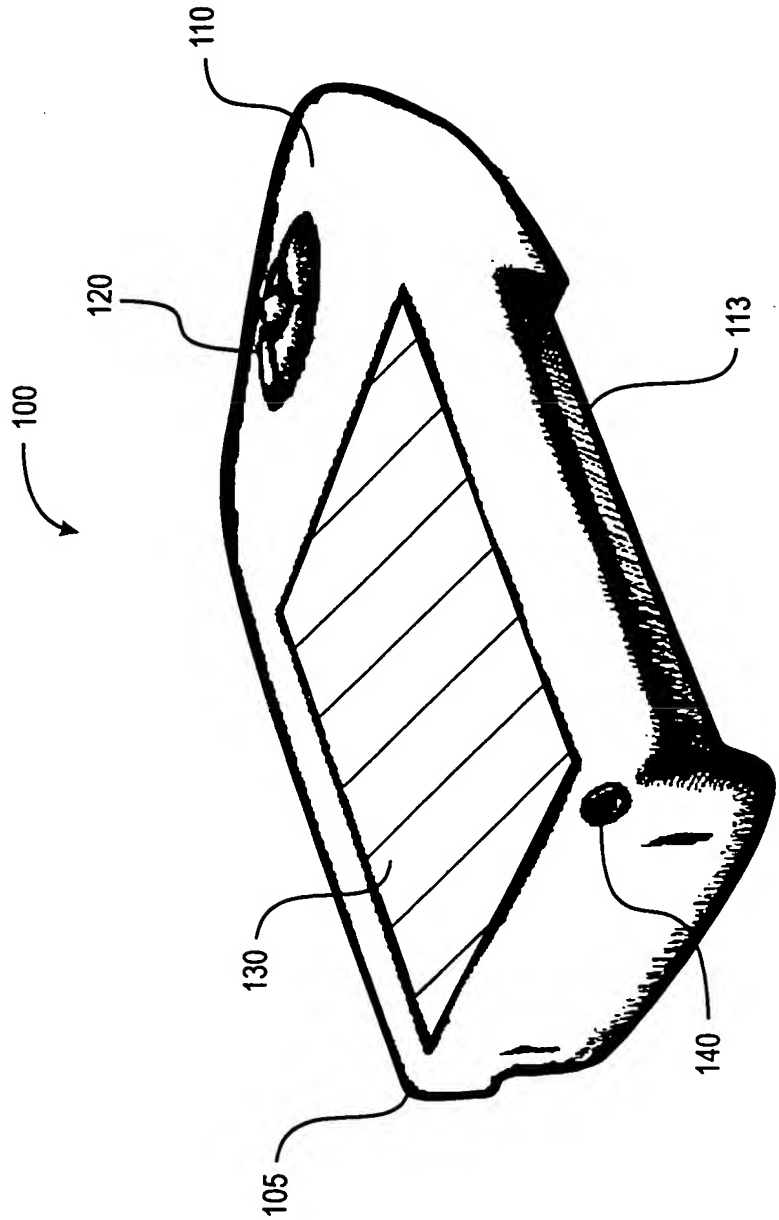

FIG. 1A

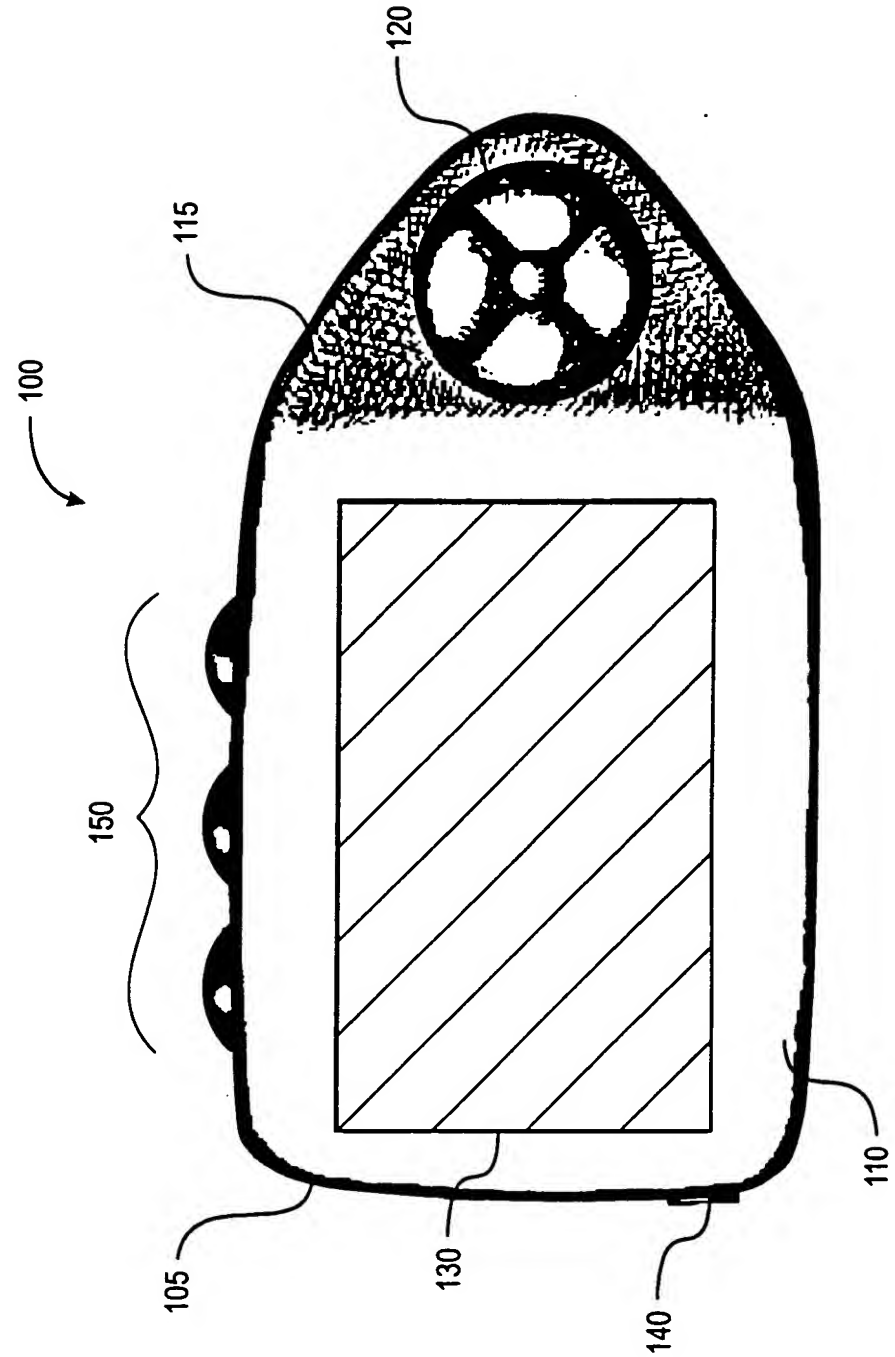

FIG. 1B

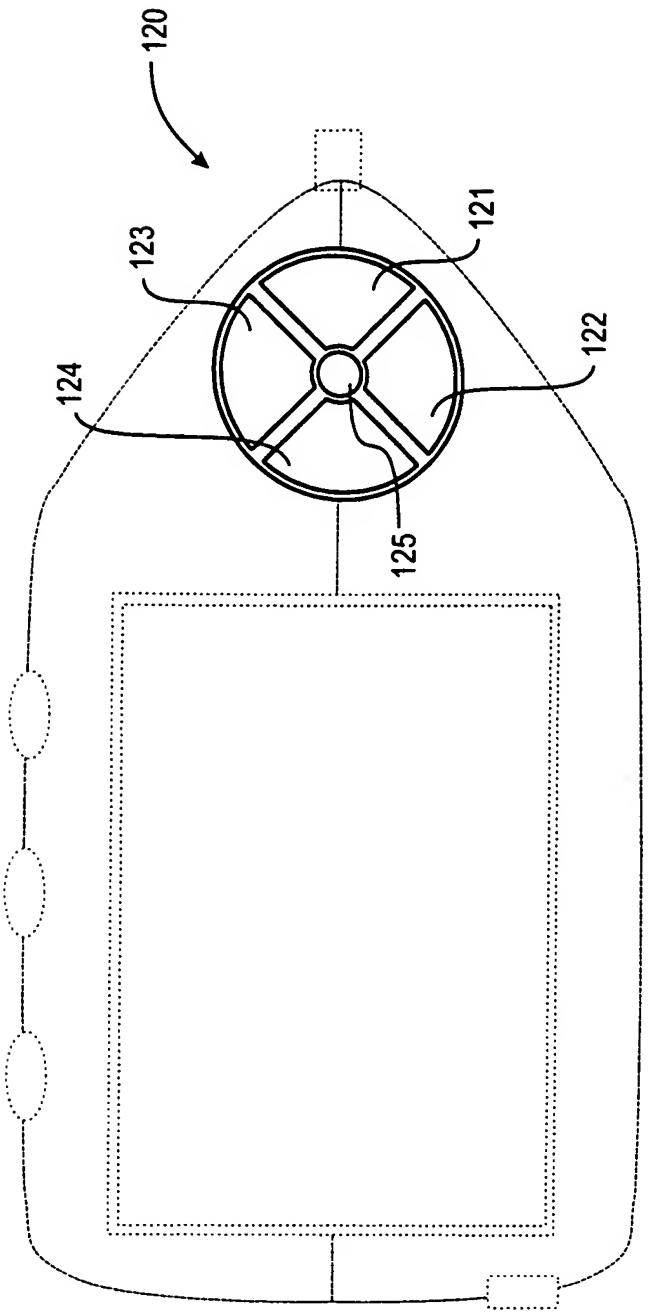

FIG. 1C

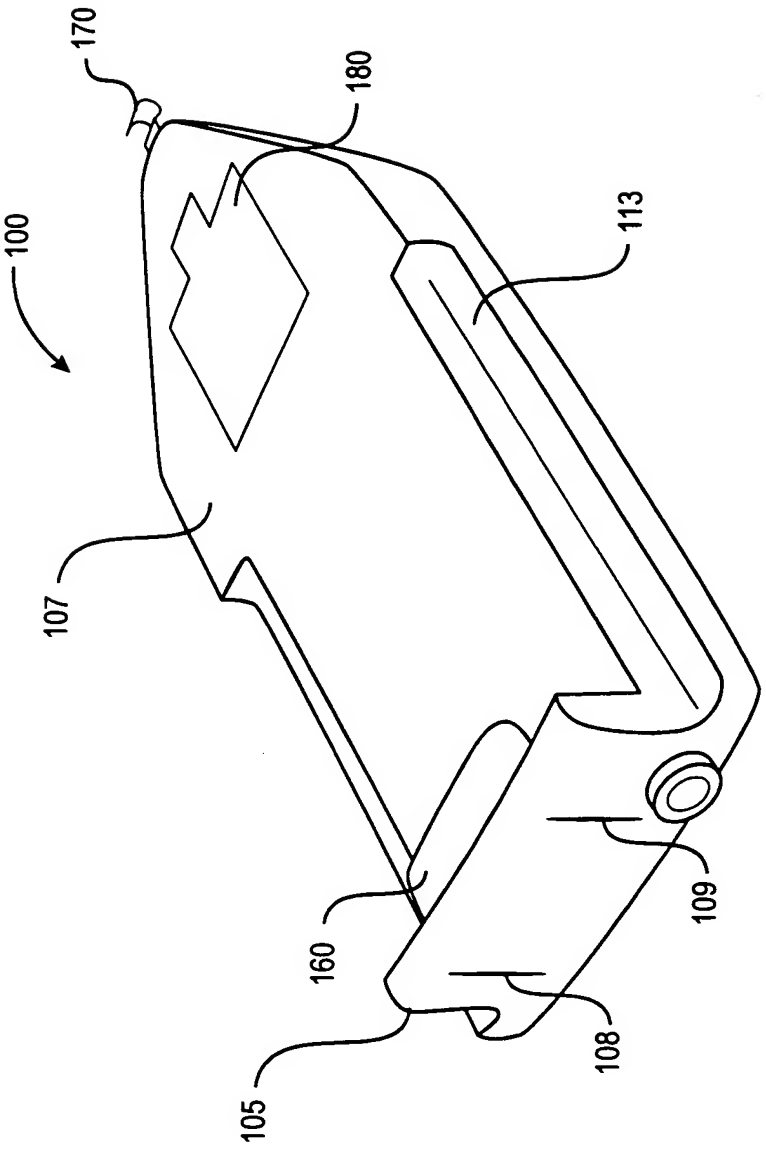

FIG. 1D

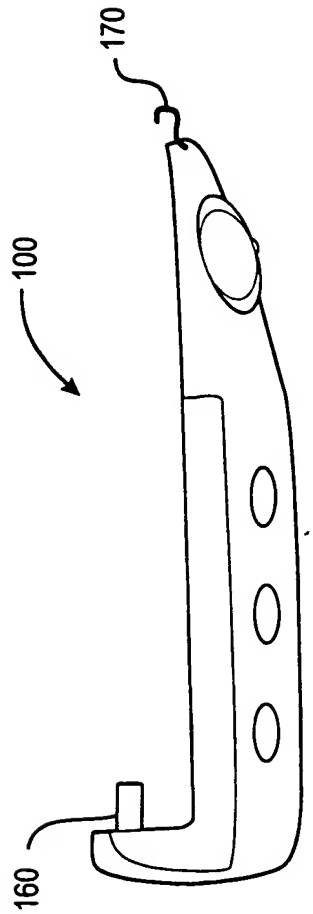

FIG. 1E

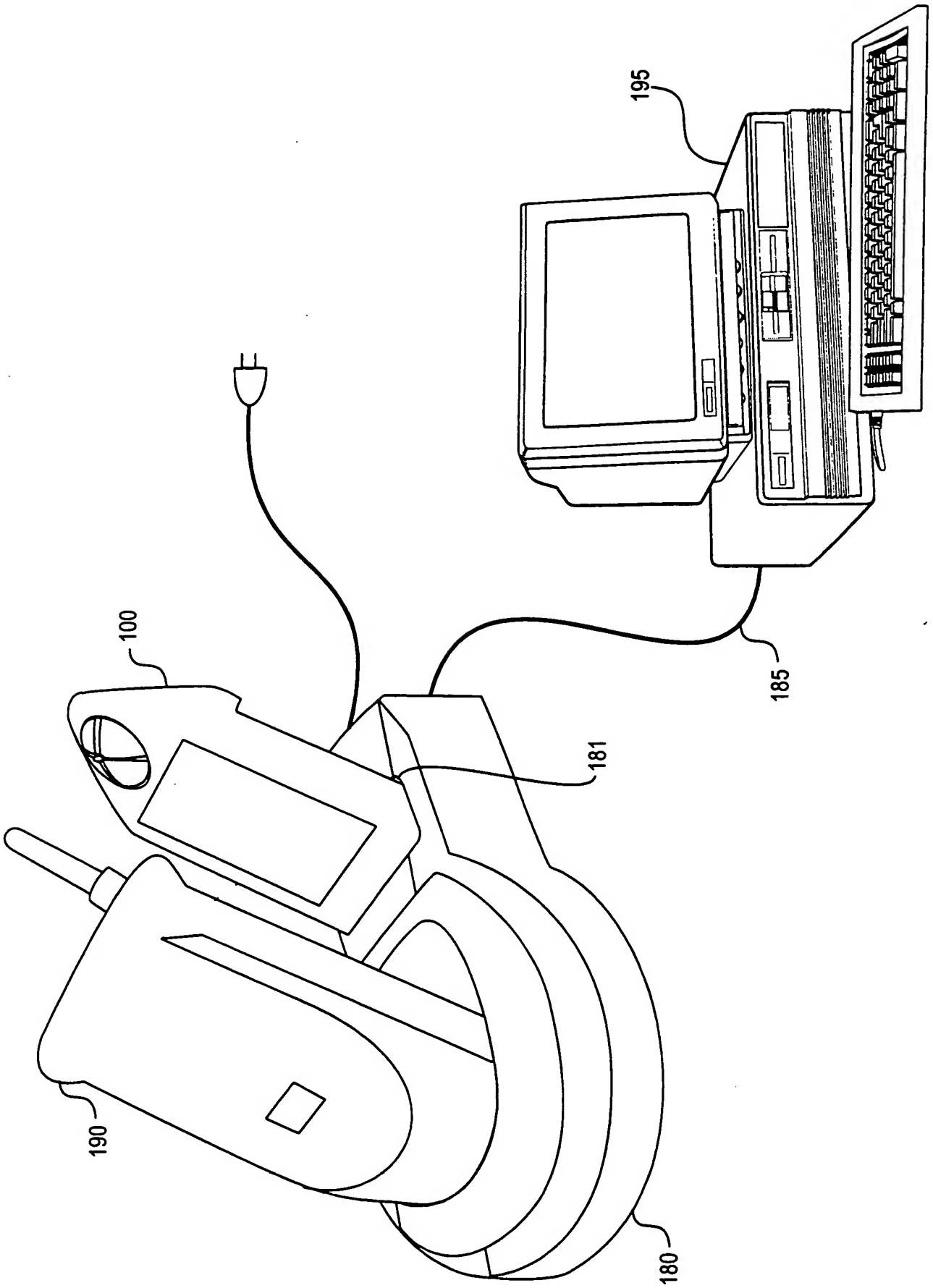

FIG. 1F

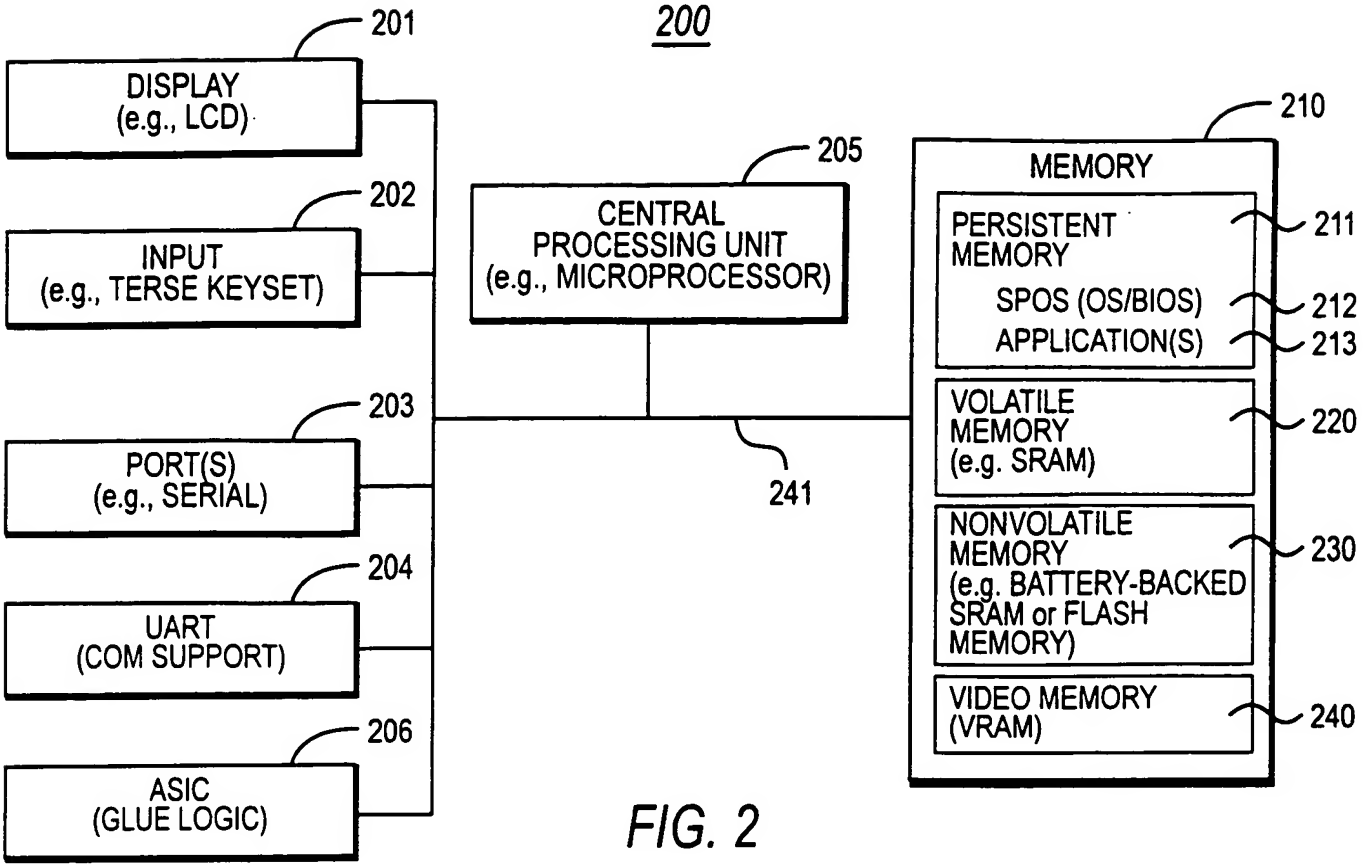
200
201
DISPLAY
(e.g., LCD)
202
INPUT
(e.g., TERSE KEYSET)
203
PORT(S)
(e.g., SERIAL)
204
UART
(COM SUPPORT)
206
ASIC
(GLUE LOGIC)
205
CENTRAL
PROCESSING UNIT
(e.g., MICROPROCESSOR)
241
210
MEMORY
PERSISTENT
MEMORY
211
SPOS (OS/BIOS)
212
APPLICATION(S)
213
VOLATILE
MEMORY
(e.g. SRAM)
220
NONVOLATILE
MEMORY
(e.g. BATTERY-BACKED
SRAM or FLASH
MEMORY)
230
VIDEO MEMORY
(VRAM)
240

FIG. 2

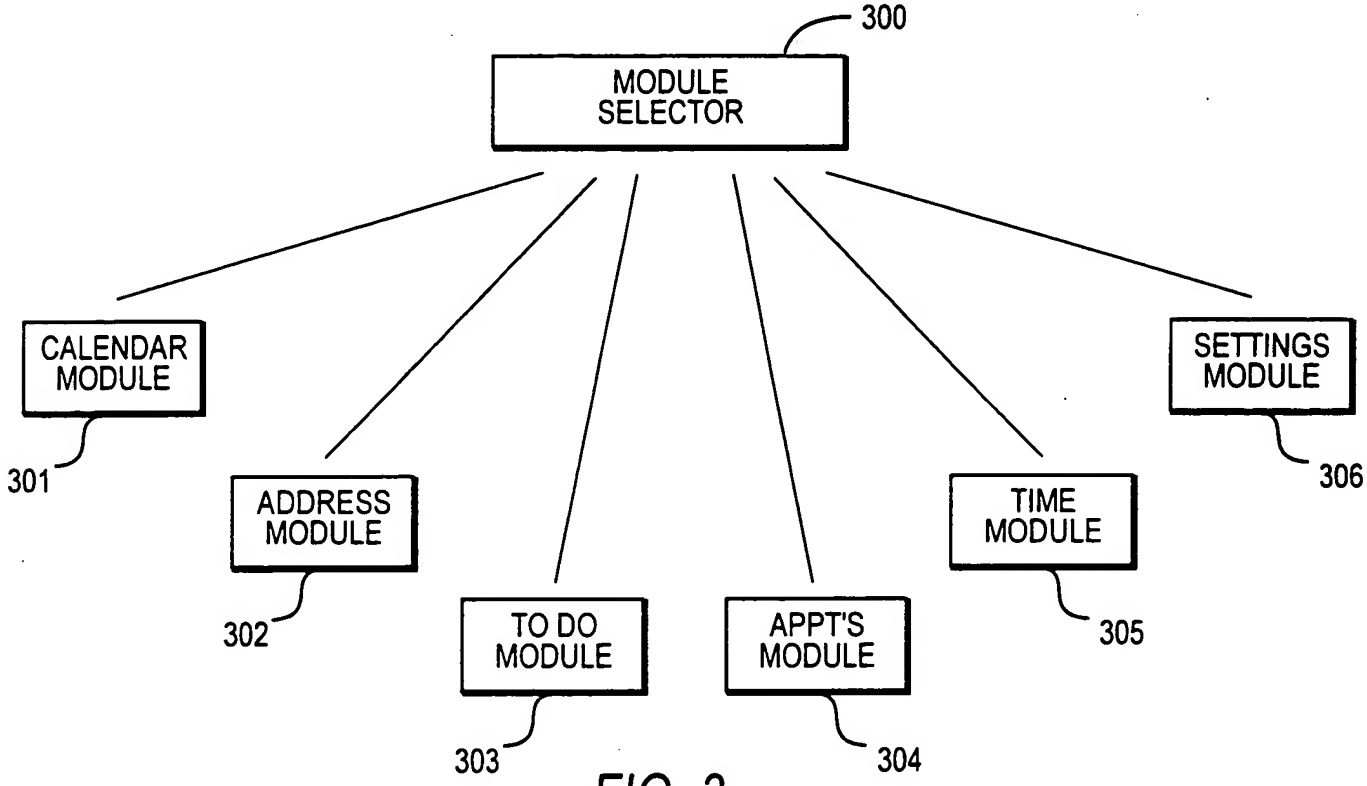
300
MODULE
SELECTOR
CALENDAR
MODULE
301
ADDRESS
MODULE
302
TO DO
MODULE
303
APPT'S
MODULE
304
TIME
MODULE
305
SETTINGS
MODULE
306

FIG. 3

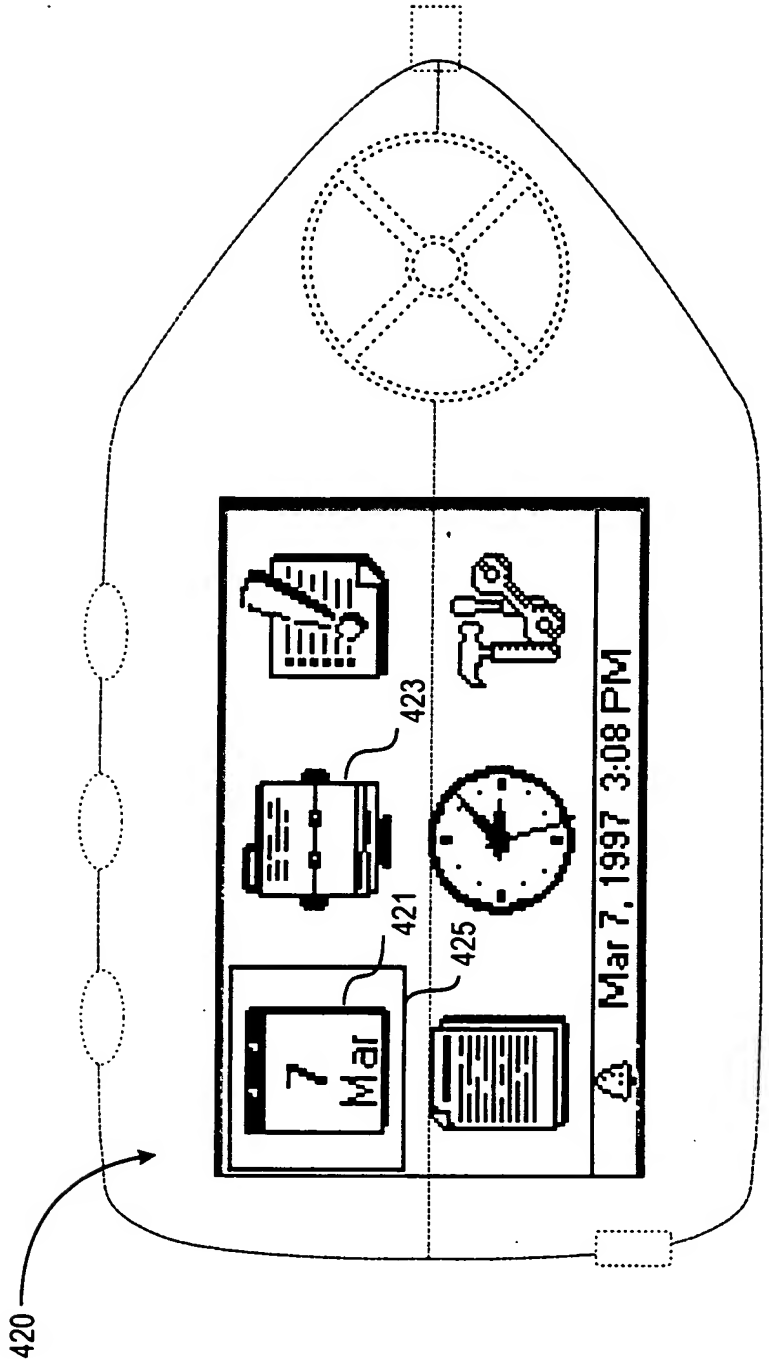

FIG. 4

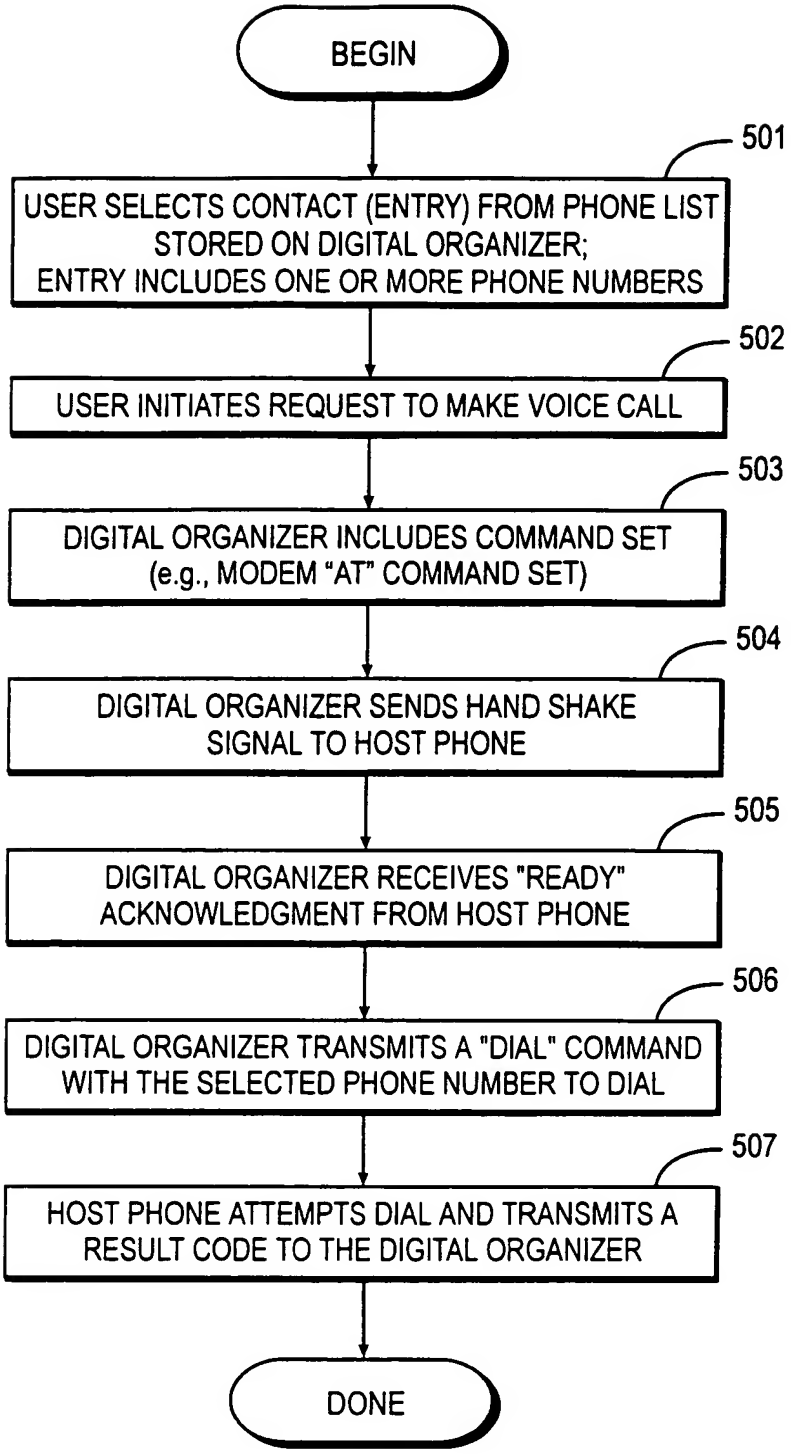
500
BEGIN
501
USER SELECTS CONTACT (ENTRY) FROM PHONE LIST STORED ON DIGITAL ORGANIZER; ENTRY INCLUDES ONE OR MORE PHONE NUMBERS
502
USER INITIATES REQUEST TO MAKE VOICE CALL
503
DIGITAL ORGANIZER INCLUDES COMMAND SET (e.g., MODEM "AT" COMMAND SET)
504
DIGITAL ORGANIZER SENDS HAND SHAKE SIGNAL TO HOST PHONE
505
DIGITAL ORGANIZER RECEIVES "READY" ACKNOWLEDGMENT FROM HOST PHONE
506
DIGITAL ORGANIZER TRANSMITS A "DIAL" COMMAND WITH THE SELECTED PHONE NUMBER TO DIAL
507
HOST PHONE ATTEMPTS DIAL AND TRANSMITS A RESULT CODE TO THE DIGITAL ORGANIZER
DONE

FIG. 5A

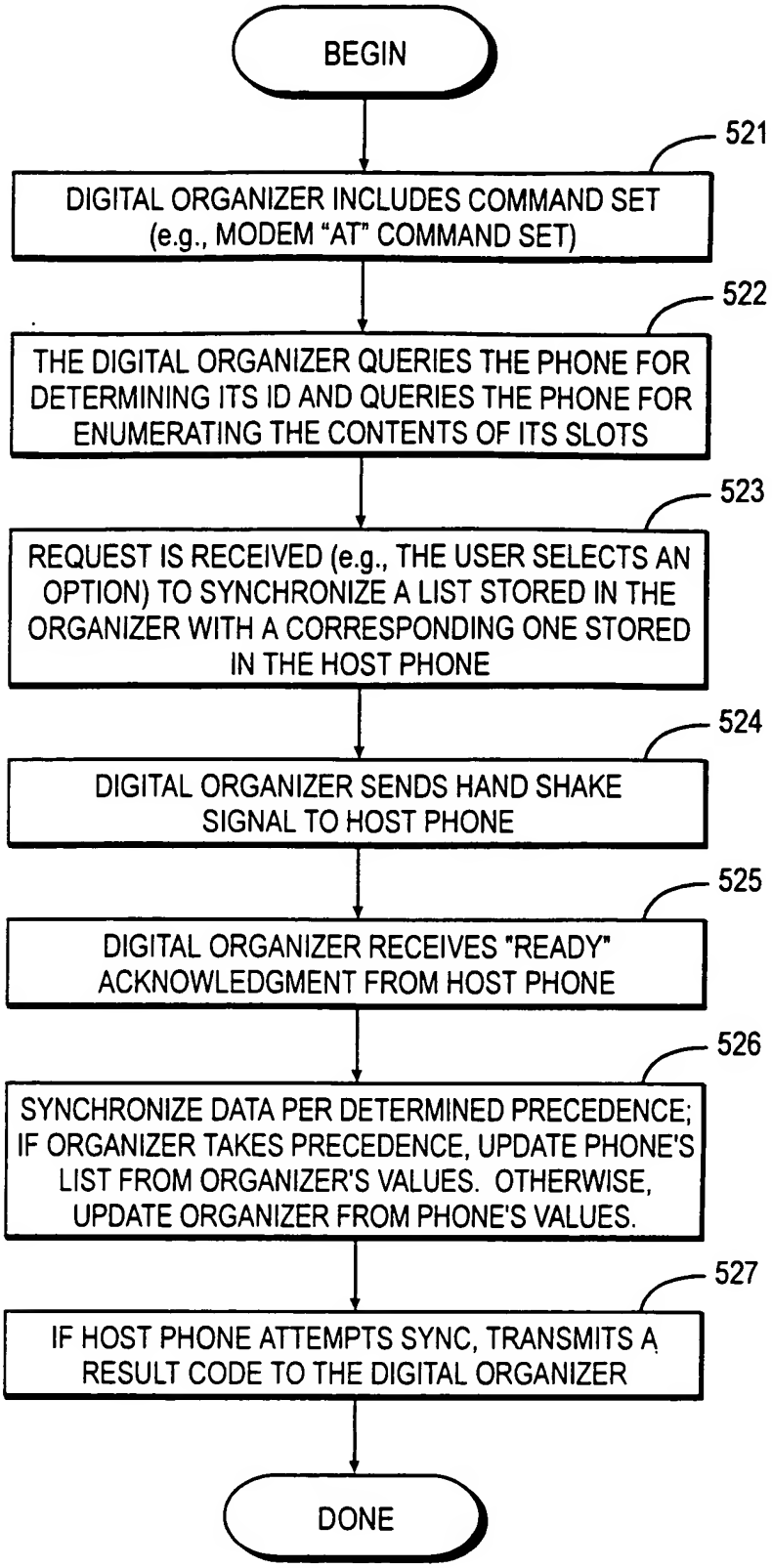
520
BEGIN
521
DIGITAL ORGANIZER INCLUDES COMMAND SET (e.g., MODEM "AT" COMMAND SET)
522
THE DIGITAL ORGANIZER QUERIES THE PHONE FOR DETERMINING ITS ID AND QUERIES THE PHONE FOR ENUMERATING THE CONTENTS OF ITS SLOTS
523
REQUEST IS RECEIVED (e.g., THE USER SELECTS AN OPTION) TO SYNCHRONIZE A LIST STORED IN THE ORGANIZER WITH A CORRESPONDING ONE STORED IN THE HOST PHONE
524
DIGITAL ORGANIZER SENDS HAND SHAKE SIGNAL TO HOST PHONE
525
DIGITAL ORGANIZER RECEIVES "READY" ACKNOWLEDGMENT FROM HOST PHONE
526
SYNCHRONIZE DATA PER DETERMINED PRECEDENCE; IF ORGANIZER TAKES PRECEDENCE, UPDATE PHONE'S LIST FROM ORGANIZER'S VALUES. OTHERWISE, UPDATE ORGANIZER FROM PHONE'S VALUES.
527
IF HOST PHONE ATTEMPTS SYNC, TRANSMITS A RESULT CODE TO THE DIGITAL ORGANIZER
DONE

FIG. 5B

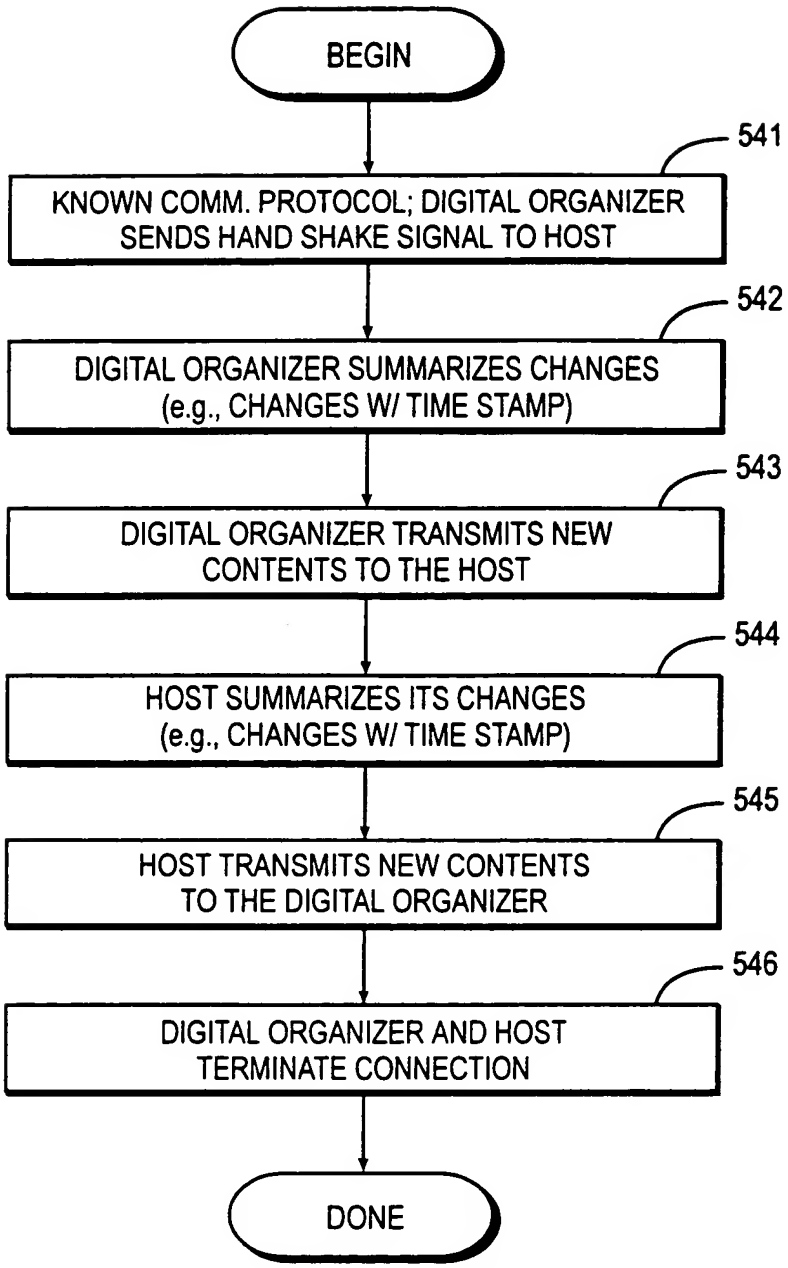
540
BEGIN
541
KNOWN COMM. PROTOCOL; DIGITAL ORGANIZER SENDS HAND SHAKE SIGNAL TO HOST
542
DIGITAL ORGANIZER SUMMARIZES CHANGES (e.g., CHANGES W/ TIME STAMP)
543
DIGITAL ORGANIZER TRANSMITS NEW CONTENTS TO THE HOST
544
HOST SUMMARIZES ITS CHANGES (e.g., CHANGES W/ TIME STAMP)
545
HOST TRANSMITS NEW CONTENTS TO THE DIGITAL ORGANIZER
546
DIGITAL ORGANIZER AND HOST TERMINATE CONNECTION
DONE

FIG. 5C

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I declare that:
My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **Camel-Back Digital Organizer for a Cellular Phone Device**, the specification of which [ ] is attached hereto or [X] was filed on **May 1, 1998** as Application Serial No. **09/071,748** and was amended on **June 22, 1998** (if applicable).

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Country	Application Number	Date of Filing	Priority Claimed Under 35 USC 119
			Yes No
			Yes No

I claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Date of Filing	Status
08/905,463	8/4/97	Pending
60/080,295	3/31/98	Pending

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office in connection therewith.

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Residence & Citizenship	*City*	*State/Foreign Cntry.*	*Citizenship*	
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Residence & Citizenship	*City*	*State/Foreign Cntry.*	*Citizenship*	
Post Office Address	*P.O. Address*	*City*	*State/Ctry*	*ZipCode*

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature - Inventor #1	Signature - Inventor #2	Signature - Inventor #3
Date 6/25/98	Date 6/24/98	Date
Signature - Inventor #4	Signature - Inventor #5	Signature - Inventor #6
Date	Date	Date

SF/0021.02.poa